REMARKS

I. STATUS OF CLAIMS AND SUPPORT FOR AMENDMENTS

Upon entry of this amendment, claims 1-5, 8-17, and 22-29 will be pending in this application. Claims 6, 7, and 18-21 have been canceled.

Applicants have amended claims 1-5 and 8-17 to use conventional "comprising" terminology, to recite positive process steps, and to use terminology that is consistent throughout. Claims 5 and 15-17 have been amended to clarify the basis of the recited weight percentages.

New claim 22 is supported by the specification at page 6, lines 20-25.

New claim 23 is supported by the specification at page 5, lines 22-24.

New claim 24 is supported by the specification at page 3, lines 18-26.

New claim 25 is supported by the specification at page 6, lines 5-10.

New claim 26 is supported by the specification at page 3, lines 27-29.

New claim 27 is supported by the specification at page 3, lines 30-32.

New claim 28 is supported by the specification at page 4, lines 24-26.

New claim 29 is supported by the specification at page 6, line 30.

No new matter has been added.

II. OBVIOUSNESS REJECTION

In paragraph 2 of the Office action, the Examiner has rejected claims 1-5 and 8-17 as obvious under 35 U.S.C. § 103(a) over U.S. Patent No. 4,869,974 (Oskarsson et al.) in view of U.S. Patent No. 5,290,507 (Runkle). Applicants respectfully traverse this rejection and request its reconsideration and withdrawal.

The rationale for the Examiner's rejection is summarized by a paragraph at page 3 of the Office action:

> Oskarsson et al. ('974) do not disclose that the powder blank is formed by hot isostatic pressing as claimed. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the cold isostatic pressing of Oskarsson et al. ('974) with the claimed isostatic pressing with expected success, because they are functionally equivalent in terms of densifying powders as disclosed by Runkle ('507) (col. 1, lines 9-17). See MPEP 2144.06.

Applicants respectfully submit that the Examiner's stated rationale makes clear that the Examiner has failed to establish a *prima facie* case of obviousness for the following reasons.

Contrary to the Examiner's unsupported assertions, cold isostatic pressing (CIP) and hot isostatic pressing (HIP) are not equivalents.

CIP increases the density of a powder, typically from about 55-65% to a density of about 75-85% (see, e.g., a mechanical engineering or materials engineering handbook, such as the ASM Handbook). The result of the CIP process is a compacted powder, having individual particulates that are held together by friction, shape locking, and other mechanical means, but containing significant void spaces between them. By contrast, HIP increases the density of a powder from about 55-65% to a density of around 100%, i.e., fully densified. The result of the HIP process is a material that is comparable to a cast or forged material.

As a result, the HIP product can be further worked using any of a variety of hot working methods, including rolling, radial die forging, open die forging and the like. The CIP product, by contrast, can only be further worked when the material is constrained by a die or mold, or by an extrusion nozzle, due to its nature as a collection of individual particles.

Because of the significant differences in the HIP and CIP processes, and in the products resulting therefrom, it is incorrect to assert that, in general, HIP is an

equivalent replacement for CIP. This is particularly true when it comes to replacement of CIP in a process such as that disclosed by Oskarsson et al., which is directed to the use of an extrusion process as a technique for producing a material having a lamellar structure. CIP, as it is used in Oskarsson et al., is simply a method of getting particles to stay in place long enough to be extruded.

One of ordinary skill in this art would not be led to use HIP in the process of Oskarsson et al. for several reasons. First, HIP fully densifies the material, so that individual particles lose their integrity, and can be thought of as becoming individual crystal grains. This is indicated by the Examiner's own Runkle reference at column 1, lines 27-35:

> In the hot isostatic process, densification to full density is achievable with most materials. The resulting mechanical properties are equivalent to those of wrought parts in similar structural condition. In some materials, the properties of the hot isostatic product are superior because of reduced anisotropy. Hot isostatic pressing has been used extensively in commercial production of high speed tool steel billets and near net shapes of full density.

By contrast, Oskarsson et al. specifically require that the material undergoing extrusion be in the form of a mass of individual particles of the hard component:

> If, instead, the hardmaterial is present in form of new powder, active surfaces are continuously created during the compaction process. Extrusion has turned out to be a suitable compaction process. The degree of working is important. It has turned out that an extrusion ratio of at least six, preferably at least eight, calculated on the material in powder form is needed to get a good bond. (The extrusion ratio is defined as the initial area of the powder body relative to the final area of the dense body previously consisting of powder).

Oskarsson et al., column 2, lines 11-20.

The very portion of Oskarsson et al. upon which the Examiner relies as teaching the claimed hot working degree also teaches that the material entering the

extruder must be particulate because compaction in the extruder grinds the particles, continuously creating the new active surfaces necessary to get good bonding with the matrix. CIP provides such a particulate material. HIP does not. Accordingly, the Examiner's own reference teaches away from the use of HIP therein, and one of ordinary skill in the art, in view of such a teaching, would not have replaced the CIP of Oskarsson et al. with HIP.

Second, in the section quoted above, Runkle teaches that HIP results in a product with reduced anisotropy. Yet the entire point of Oskarsson is to obtain a lamellar structure, which is highly anisotropic in at least one direction. The Examiner apparently considers the teachings of Runkle and Oskarsson et al. to be sufficiently analogous that one of ordinary skill in the art would look from Oskarsson et al. to Runkle for teachings about how to modify the Oskarsson et al. process. Applicants respectfully submit that such a worker, put in view of the teachings of both references, would be led away from using HIP in the Oskarsson et al. process due to the decrease in anisotropy that would result.

Third, the hard component of Oskarsson et al. is a phase containing large amounts of hard ceramic components:

> The material rich in hard constituents (hereinafter called hard material) comprises hard constituents of carbides, nitrides, oxides, borides, silicides, carbonitrides, oxycarbides, oxynitrides, oxycarbonitrides, etc., of Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W and/or Al in a matrix based on Fe, Ni and/or Co. The amount of hard constituents is 30-70 vol.%.

Oskarsson et al., column 1, lines 34-40. Applicants submit that such a material would form a hard, solid, non-ductile hard metal structure upon compaction by HIP. The material resulting from a HIP process would thus require a great amount of force, and a high temperature in order to be extruded, apparently greater and higher

than contemplated by Oskarsson et all, which makes no mention of any unusual requirements in this regard. Such a material would also result in increased wear on the extrusion nozzle, and be difficult to control, due to the formability differences between the hard and tough components. For this reason as well, one of ordinary skill in the art would be led away from replacing the CIP process in Oskarsson et al. with the HIP process suggested by the Examiner.

With regard to claims 5 and 15-17, the Examiner asserts that limiting the amount of carbide forming additives to 3-20 wt.% would have been obvious because:

> it is well held that discovering an optimum value of a result-effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the instant case, the contents of C and Cr (also a carbide forming element) in the powder mixture are result-effective variables, because they would directly affect the hardness of the materials as disclosed by Oskarsson et al. ('974) (col. 3, lines 8-32). Therefore it would have been obvious to one skilled in the art to have optimized the contents of C, Cr and carbide-forming additives of Oskarsson et al. ('974) in view of Runkle ('507) in order to achieve desired hardness of hard and tough materials and the hardness distribution within the composite material parts.

Office action dated October 12, 2007 at pages 4-5. Applicants respectfully submit that the Examiner's conclusion of obviousness is incorrect because it is equally well held that it is not routine optimization to deviate from the prior art's express teachings.

Oskarsson et al. teach that the amounts of carbide forming additives, which appears to be equivalent to the amount of "hard constituents" in Oskarsson et al., are in the range of 30-70 vol.%, in other words, that the amount of hard constituents should be relatively high, and can form a major part of the material. Applicants' claims, by contrast, recite that these components should be present in amounts of 3-20 wt.%, i.e., that they make up only a minor part of the material. Substantially

decreasing the amount of such materials present, in accordance with Applicants' claims, goes against the express teachings of Oskarsson et al., and is therefore not appropriately dismissed as "routine optimization." Applicants respectfully submit that claims 5 and 15-17 are separately patentable due to this additional distinction from the cited references.

Applicants respectfully submit that the Examiner has failed to establish a prima facie case of obviousness for at least the reasons given above. As a result, the obviousness rejection should now be withdrawn. Applicants submit that this application is in condition for immediate allowance, and an early notification thereof is solicited. If the Examiner believes that any issues remain to be resolved, he is respectfully requested to contact the undersigned to arrange for a telephonic or personal interview to discuss these issues, prior to the issuance of any final rejection.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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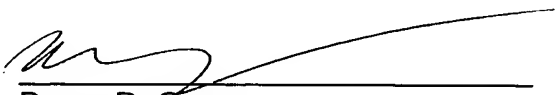
By: 

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